



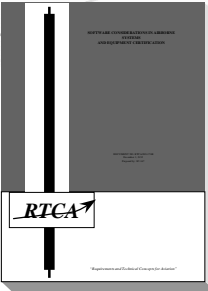
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DO-178B Misconceptions


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 Common DO-178B
Misconceptions



Presented By:
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Overview

- The Plans
- Life Cycle Models
- Transition criteria
- HL and LL Requirement
- Derived Requirements
- Trace-ability
- Standards
- The tables as a checklist
- Table A-6
- Robustness
- Data and Control Coupling
- CC1 vs. CC2


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The Plans



- All Plans for level A&B are under CC1 (they require change control, review, and tracking)
- The plans are not meant to be write-only technology they are supposed to be read by the people that use them and followed
- For levels A,B &C a verification record is required to show the plans were reviewed against DO-178B

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Life Cycle Models

- DO-178B allows for any life cycle model that meets the objectives.
- Page 13 shows some that may not even make sense
- Waterfall developments generally don't work today – wait till the end to find flaws – too expensive!!
- Very often companies do a modified prototype to understand the requirements and then develop from there.

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Life Cycle Models Continued

- DO-178B clearly allows for reverse-engineering – it even states it.
- DO-178B does force you to specify the model employed with transition criteria between phases – then follow it!



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Transition Criteria

- Transition criteria are to be specified in the plans
- Criteria has to be specified well enough to assure it was met
- Requires a QA record be generated before next life-cycle process begins
- Easy to detect correctness by looking at CM records -- can tell real life cycle model employed

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HL & LL Requirements Questions Everyone Asks

What is the difference between LL and HL requirements?

- What vs. How (e.g. Air Ground determination)

Can I put them both in the same document?

- It adds complications with respect to identification and trace ability

What is design according to DO-178B?

- LL requirements and architecture

Is psuedo-code a good form of LL requirements?

- generally after the code is developed it is of no use, it is hard to maintain and if coded well it is no more understandable than the code itself



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Derived Requirements

- If it doesn't trace it must be a derived – wrong – derived requirements are usually based on a design decision – sometimes it is called derived but is actually decomposed.
- Derived requirements must be passed back up to the system safety assessment
- Does a COTs vender specify and supply all derived requirements? Do they know what is derived? If not will they be passed back?

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Trace-ability

Is forward and backwards trace-ability the same?

- Not necessarily

What is the difference?

- Forward shows you met all the requirements
- Backwards says you met nothing but the requirements.

Does DO-178B only require backwards?

- No -- requires both since the objective as written states backwards – the reference to the objective states forward



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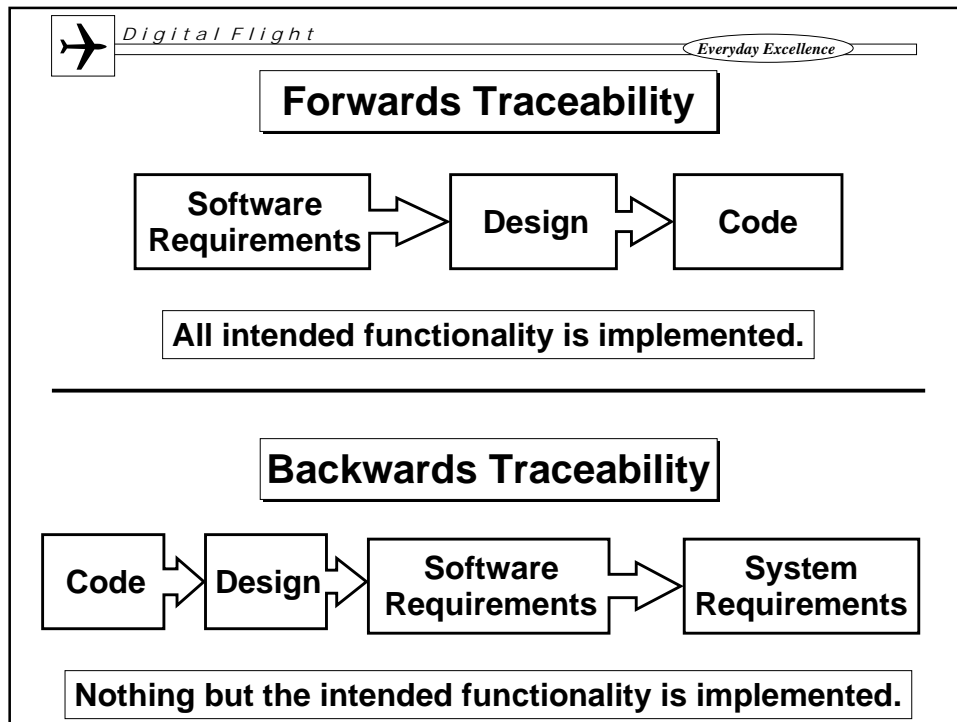
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Trace Table

System Req'mts	Software Req'mts	Design	Code/Module	Test
3.1.4	2.4.3	4.2.1	Correlate	4
			Associate	4
	4.1.2	2.3.6	Track update	4
			Track initiate	

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The slide has a header with an airplane icon, the text "Digital Flight", and a logo with the text "Everyday Excellence". The main title is "Standards". Below the title are two questions, each followed by a bulleted list of points.

Standards

What should be in the standards?

- Formatting
- Constraints on language or tool usage etc.
- For instance if a developer is using only certain features it should be stated which to use and which to stay away from
- May want to limit C language to "safe-C", etc.

Are standards to be followed?

- Absolutely – may want to state what the musts are and what are the nice to have features

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DO-178B Tables as Verification Checklist

- Not very good for developers to use tables this way
- Not specific enough
- Should give develop clearer verification guidance/checklist for use during a review -- What does “the code is accurate” really mean when reviewing



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Correctness with Respect to Variables

All variables used are also defined.

All variables are explicitly initialized before use.

Variables are used for only one purpose .

Flags and indexes are used properly (as intended).

Bit fields are defined and used properly (as intended).

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Table A-6 – The Testing Table

The executable object code must comply with the high level requirements normal and robust.

The executable object code must comply with the low level requirements normal and robust.

“No one tests units/LL req any more they just do code reviews”

- Do they do it at the executable object level? -- I doubt it!
- How do they meet Table-A-6?

If the LL req are specified at the unit level then, then either they must

- Test all units (normal and robust Level A – C)
- Test normal and robust all LL requirements with HL test cases (and prove it - Not so easy when using data structures)
- Or a combination of the two



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Robustness Testing

What is Robustness testing?

- It is the try and break it mentality!!

Are boundary values considered robustness?


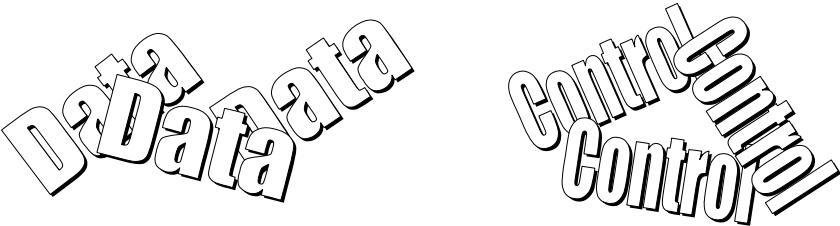
- No – outside the bounds are!


Does DO-178B say how many robustness tests are required?

- No – it depends on the requirement!

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Data Coupling	Control Coupling
<ul style="list-style-type: none">• Interfaces• Typing• Global usage• Inheritance	<ul style="list-style-type: none">• Calling tree• Timing of events• Scheduler/transition• Interrupts

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<h2>Data Coupling</h2>	
<p>The analysis should be dependent on how the software is developed:</p>	
<ul style="list-style-type: none">• Global data requires a different process then presented in the guidance• Information hiding requires interfaces be assessed (can be tested) – like DO-178B says• Object oriented requires the classes and inheritance etc requires analysis as well	

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Data Coupling – Global Data

- Need to determine for each variable is it used consistently (same type, meaning, units) – what about type casting, arithmetic conversion?
- Precision – single vs. double
- Radians vs. Degrees -- Where are the units specified?
- Are they properly initialized before use?



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Data Coupling – Interfaces

Are the parameters passed by the calling routine consistent with the parameter list of the receiving routine?

- Number
- Definition
- Type
- Order

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Data Coupling -- Object Oriented

- Is the right class used with each method?
- Does the method use the right class data correctly?



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Data Stored in a Locked File Cabinet



CC1 or CC2 ?

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Three Things To Remember With Respect To DO-178B

- Say what your going to do – develop plans
- Do what you say – follow them
- Prove it -- maintain records



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The End & Thank You

